

Comparison of Simultaneous Prompting to No-No Prompting on

Discrimination Learning for Three Children with Autism

BY

C2008

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Dedicated in the Memory of

Edward Leaf

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### Abstract

There are many different prompting systems that are being implemented to teach children with autism a variety of skills. This study looked to compare no-no prompt to simultaneous prompting for three children with autism. Both prompting systems were used to teach participants either rote math skills, receptive labels, or answers to “Wh” questions. An alternative treatment design was used to determine the effectiveness of each of the two prompting systems. Results of the study showed the no-no prompting procedure was effective in teaching all skills to the three participants. Whereas the simultaneous prompting procedure was effective in teaching only one pair of skills for one participant. Results also indicated a learning-to-learn phenomenon for two of the participants with the no-no prompt procedure. Finally, a preference assessment was conducted to determine which of the two prompting procedures the three participants preferred; results were mixed across the three participants.

## Comparison of Simultaneous Prompting to No-No Prompting on Discrimination Learning for Three Children with Autism

### Introduction

It is often difficult to teach new skills to children with autism, particularly when using typical classroom teaching methods. Research by Lovaas (1987) and by McEachin, Smith, and Lovaas (1993), however, has documented effective teaching of young children with autism using structured teaching methods that rely heavily on discrete trial teaching. There are several elements of discrete trial teaching: each teaching trial starts when the teacher presents a stimulus (typically a request) to the child and typically waits a short time for the child to respond. If the child responds correctly, the teacher provides a positive reinforcer immediately following that response; if the child does not respond or responds incorrectly to the teacher's request, then the teacher typically prompts the child to respond correctly and provides the positive reinforcer immediately following the correct prompted response. Then, the teacher starts the next trial. Discrete trial teaching continues in this way until the child learns to respond correctly to the teacher's request without the prompt. Since the child is being taught new skills and is not likely to respond correctly at the beginning, prompts are a critical part of the teaching process.

Prompts are anything that the teacher does prior to or during a teaching trial to get the learner to display a correct response. Prompts can take many forms. The prompt can be a demonstration or model (DiCarlo & Reid, 2004; Lovaas, 2003), or it can be physical guidance or assistance (MacDuff, Krantz, & McClannahan, 1993;

Lovaas, 2003). There are at least two important things about prompts. First, the prompts need to be effective. That is, the prompt needs to be able to produce the correct response from the child. For example, a demonstration or model probably would not be effective if the child did not already know how to imitate. Thus, the selection of a prompt for its effectiveness is critical. Prompts that reliably produce the correct response to a particular request are sometimes referred to as controlling prompts. A second important thing about a prompt, or about how teachers use prompts, is whether it can be removed so that the child will eventually learn to produce the correct response without prompts.

There are a variety of suggestions in the literature about what types of prompts should be used when teaching children with autism and how these prompts should be removed so that the child learns to respond to the teacher's request without the prompt. Correspondingly, there are a number of ways of using prompts that have been developed (Touchette & Howard, 1984; Touchette, 1971; Wolery, Gast, Kirk, & Schuster, 1988; Horner & Keilitz, 1975; Wolery, Ault, & Doyle, 1992).

Unfortunately, there has been relatively little research comparing the effectiveness of the different ways in which prompts can be implemented and removed. This study attempted to assess and compare the effectiveness of two prompting strategies (simultaneous prompting and no-no prompting) as they relate to teaching three children diagnosed with autism.

Simultaneous prompting and no-no promoting are procedurally different in several ways. In simultaneous prompting, a request or instruction is given by the

teacher and, before the learner has a chance to respond, the teacher provides a controlling prompt (a prompt that insures that the learner will make a correct response). Then the teacher provides a positive reinforcer for the correct response. The purpose of providing the controlling prompt immediately after the request or instruction is to try to minimize the number of incorrect responses or errors made by the learner. Periodically, to evaluate if the learner is able to make the correct response without the prompt, there are test or probe trials in which the teacher simply presents the instruction or request without the controlling prompt. If the learner makes a correct response, the teacher provides positive reinforcement. If the learner does not make a correct response, there are no consequences. The object of this, of course, is to determine if the learner now displays the correct response to the teacher's request or instruction without any additional prompts from the teacher.

In no-no prompt procedures, the teacher presents a request or instruction to the learner and waits for a response from the learner. If the learner makes a correct response, the teacher provides positive reinforcement. If the learner does not make a correct response, the teacher says, "no" and then starts the next teaching trial by providing the request or instruction again. If the learner makes a correct response, the teacher provides positive reinforcement. If the learner does not make a correct response, the teacher again says "no" and starts the next teaching trial. If the learner has not provided a correct response on two consecutive teaching trials for the same learning task, the next teaching trial is a prompted one. In this case, the teacher would provide the instruction or request, immediately provide a controlling prompt, and then

provide positive reinforcement for the correct response. Following the prompted trial, the teacher would then initiate the next teaching trial with no prompts. In no-no prompt, the measure of the learner's learning of the skill typically is their performance on the unprompted trials during the teaching.

There have been a substantial number of publications that have reported using simultaneous prompting procedures to teach children new skills. Most of the studies have been done with typically developing children, although four studies have included one or more children with autism.

Gibson and Schuster (1992) conducted the first experiment examining the effectiveness of simultaneous prompting in teaching four children to read aloud words printed on a card. Participants ranged from 57 to 61 months old. Two participants were diagnosed with a disability (i.e., one with spina bifida and one with mild development delay) and two of the participants were typically developing. The study attempted to teach each of the participants to read aloud 15 different printed words, which consisted of common objects, buildings, people, and animals, when instructed to do so. A teaching session consisted of the teacher holding up a flash card with a word printed on it, asking the participant "What word?", followed by the teacher providing an immediate controlling prompt (verbal prompt), followed by the participant stating the word, and then the teacher providing descriptive verbal praise (e.g., "Good job that does say bird.") to the learner. Since the teacher always provided the learner with a controlling prompt, a daily probe session was implemented prior to teaching to determine if the learner could independently state the printed word shown

to them. The daily probe session followed the exact same procedure as a teaching session; however, during the daily probe session, the teacher did not provide the learner with any prompt. Results of the study showed that three of the four participants learned to read aloud all 15 words; however, the participant diagnosed with spina-bifida did not learn any of the words using the simultaneous prompting procedure.

Since Gibson and Schuster's initial investigation on the effectiveness of simultaneous prompting (Gibson & Schuster, 1993), 20 empirical studies have been conducted examining the effectiveness of the simultaneous prompting procedure with people who have disabilities and with people who do not have disabilities. These 20 studies describe attempts to teach participants discrete skills (e.g., pointing to an object or naming object) as well as teach participants chained motor responses (e.g., tying shoes, putting on a shirt, or cooking a meal). Simultaneous prompting has also been used in both individual and group teaching situations. Finally, the effectiveness of simultaneous prompting procedures has been compared to the effectiveness of a constant time delay method of prompting. Four studies described below are ones that used simultaneous prompting procedures to teach skills to children or adolescents with autism or other developmental disabilities. Four additional studies described below compared the effectiveness of simultaneous prompting procedures to a constant time delay method of prompting.

Akmanoglu and Batu (2004) conducted a study examining the effectiveness of simultaneous prompting in teaching two adolescents with autism and one child with

autism. Participants ranged in age from 6 to 17 years old, all of whom were diagnosed with an autism spectrum disorder. The study attempted to teach each of the participants to point to nine different Roman numerals when instructed to do so. In a teaching session, the teacher placed three index cards on the table, each with a different Roman numeral; the teacher then asked the participant to identify a Roman numeral, for example, “Serap, which one is five?”, and immediately provided a controlling prompt (point prompt). When the participant pointed to the correct card, the teacher provided general verbal praise (e.g., “Good Job”). Since the learner was prompted for every response during teaching, daily probe sessions were implemented prior to teaching and during teaching to determine if the learner could independently point to the Roman numerals. The daily probe session followed the exact same procedure as a teaching session except that during the daily probe session, the teacher did not provide the participant with any prompts. The results of the study indicated that all three participants learned to point correctly to all nine of the Roman numerals that were taught to them and maintained the skills for up to four weeks after teaching ended.

Akmanoglu and Batu (2005) conducted a follow-up study that examined the effectiveness of simultaneous prompting in teaching two children with autism. The procedures of this study were essentially the same as in the earlier study, except that the children were taught to say the names of eight relatives when a picture of a relative was shown to them. The procedures were effective in teaching both participants to name all eight pictures.

Sewell, Collins, Hemmeter, and Schuster (1998) examined the effectiveness of a simultaneous prompting procedure in teaching two children with developmental disabilities how to dress themselves. One of the participants was a 28-month-old girl who was taught to put on her shirt, to put on her shoes, and to put on a jacket. Each of these three skills was broken down into smaller components for teaching purposes. A teaching session consisted of the teacher telling the participant, for example, to “Put on your shirt”, at which time the teacher provided physical prompts so that the girl correctly completed each step of putting on her shirt. The teacher provided verbal praise after the child completed each step. Similar procedures were used with a second participant to take off her shoes, take off her socks, and to take off her pants. A daily probe session, in which the teacher simply instructed the participants to put on or take off clothing items, was implemented to determine if the participants could dress themselves without any prompting from the teacher. Both participants learned to put on or take off clothing without prompts.

Parrott, Schuster, Collins, and Gassaway (2000) examined the effectiveness of simultaneous prompting in teaching five children, one diagnosed with autism, to wash their hands. Washing hands was broken down into smaller components for teaching purposes. The procedures of this study were similar to procedures implemented by Sewell et al., (1998); however, the teachers used a point prompt instead of physically guiding participants. The procedures were effective in teaching all five participants to wash their hands.



Simultaneous prompting has also been compared to constant time delay prompting in three studies. Schuster, Griffen, and Wolery (1992) compared the effectiveness of constant time delay and simultaneous prompting to teach four children with mental retardation to say words printed on a card. In the constant time-delay procedures, a teacher showed a participant a flashcard with a word on it, asked the participant "What word is this?", and waited 4 sec for the participant to respond. If the participant correctly stated the word within the 4 sec, the teacher provided praise and started the next teaching trial. If the participant stated an incorrect word within the 4 sec, the teacher simply stated the word printed on the card and started the next trial. If the participant did not make any vocal response within the 4 sec, the teacher said the word that was printed on the card, praised the participant if the participant said the word following the teacher's model, and then started the next teaching trial. In simultaneous prompting procedures, the teacher showed the participant a flashcard with a word on it, asked the participant "What word is this?" and immediately said the word. If the participant repeated the word, the teacher provided praise, and then started the next teaching trial. Since the simultaneous prompting procedure always involved the teacher using a controlling prompt, a daily probe session was needed to determine if participants could state the words without the prompt. A similar probe session was also provided for the same participants who were taught using the constant time delay procedures to ensure comparable "testing" conditions for the two prompting procedures. The daily probe session consisted of the teacher showing a participant an index card with a word printed on it and asking

“What word is this?” Any vocal response of the participant produced teacher praise. The results of the study were that both prompting procedures were effective in teaching participants to say the words on the cards, although simultaneous prompting required fewer teaching trials to teach the participants than did the constant delay procedure.

Two additional studies have been conducted comparing simultaneous prompting to constant time delay prompting. Risen, McDonnell, Johnson, Polychronis, and Jameson (2003) compared the two prompting procedures when teaching four participants with various intellectual disabilities to state words listed on cards. Risen et al. showed that three of the four participants learned to name all of the words presented during the simultaneous prompting procedures and constant-time delay procedures; one participant, however, was only able to learn words taught using the constant time delay procedure. Tekin-Iftar and Iftar-Kircalli (2002) compared the two prompting procedures to teach three children with intellectual disabilities to touch pictures of animals when requested to do so. In this study, the teaching was conducted by older siblings of the participants. Tekin-Iftar and Iftar-Kircalli found that both prompting procedures were effective in teaching participants to label all animals. Both studies showed mixed results in how quickly participants learned skills using the simultaneous prompting and constant time delay procedures.

When the results of all three studies (Schuster et al., 1992; Risen et al., 2003; Tekin-Iftar, et al., 2002) are considered as a whole, it appears that both simultaneous prompting and constant time delay prompting are effective teaching procedures and

that neither is clearly superior in terms of speed of teaching nor in consistency of effective teaching across participants.

A prompting procedure that has been frequently described as used in experiments (Lovaas, 1987) and during clinical teaching (Kates-McElrath & Axelrod, 2006; Leaf & McEachin, 1999) for children with autism is no-no prompting. As described earlier, no-no prompting is an error-correction procedure in which the learner has opportunities to make independent responses prior to using a prompt to produce a correct response. Although no-no prompting procedures have apparently been effective in helping teach children with autism in both experimental studies and in clinical programs, there have not been any published studies that have studied the effects of no-no prompting isolated from the effects of other elements of the overall teaching/clinical program. And, there have been no studies comparing the effects of no-no prompting to other prompting procedures. The purpose of this study was: (1) to compare the effectiveness of simultaneous prompting and no-no prompting in teaching three children with autism to label objects receptively, learn math facts, and answer “wh” questions and (2) to assess participant preference for the two prompting procedures.

## **Methods**

### *Participants*

Brady was a five-year-old boy diagnosed with autism. At the beginning of the study, he had received an average of 40 hours of behavior therapy each week for the previous thirteen months. Behavior therapy continued throughout the course of the

study. Brady also attended a university-affiliated preschool for two years and continued to do so during the course of the study. He was in his final year of the preschool program. Brady had good receptive and expressive language skills (e.g., he could speak in full sentences and could carry on simple conversations). He also had counting skills (e.g., he could count to at least 100) and could answer simple questions accurately about the community in which he lived. Brady exhibited no self-injurious behavior or aggression. He did, however, exhibit non-compliant behaviors such as yelling, escaping from the room, falling to the ground, tearing materials, and climbing on the table. Because of his high level of non-compliant behaviors, a token system was implemented to increase his compliance during the study. The token system consisted of Brady receiving a token every five minutes for which he was compliant. At the end of the day, Brady received a privilege at home that was determined by the number of tokens he received throughout the day. The token system was put into place prior to the beginning of this study. Brady was taught how to point to the correct sum of equations on index cards (see Table 1).

Ashley was a three-year-old girl diagnosed with autism. At the beginning of the study, she had received an average of 30 hours of behavior therapy per week for the previous year. This continued throughout the study. Ashley had attended a university affiliated preschool for one year and continued to do so during the course of the study. Ashley had no expressive language and little receptive language. She exhibited no aggression towards others but displayed low levels of self-injurious

Table 1. Brady Skills Taught (Math Facts)

Pair	Condition	Target
Pair One	No-No Prompt	1+3
Pair One	No-No Prompt	2+8
Pair One	Simultaneous Prompting	2+6
Pair One	Simultaneous Prompting	2+2
Pair Two	No-No Prompt	1+6
Pair Two	No-No Prompt	2+7
Pair Two	Simultaneous Prompting	1+4
Pair Two	Simultaneous Prompting	1+2
Pair Three	No-No Prompt	2+3
Pair Three	No-No Prompt	1+9
Pair Three	Simultaneous Prompting	2+5
Pair Three	Simultaneous Prompting	1+5
Pair Four	No-No Prompt	1+7
Pair Four	No-No Prompt	2+4
Pair Four	Simultaneous Prompting	2+9
Pair Four	Simultaneous Prompting	1+8

behavior, which included eye poking. She also displayed high levels of self-stimulatory behaviors, which included blowing, gazing, flapping, scratching, and tapping. Ashley was taught how to touch three-dimensional objects (see table 2).

Jeremy was a four-year-old boy diagnosed with autism. At the beginning of the study, he had received an average of 15 hours of behavior therapy per week for the past two years. Behavior therapy continued throughout the study. Jeremy attended a private preschool five days each week and had at-home discrete trial teaching after school. Jeremy had high levels of expressive and receptive language and exhibited no self-injurious behavior or aggression. He did, however, exhibit self-stimulatory behaviors, which included repeating instructions, asking the same questions over and over, and acting as if he was an animal or a food item. Jeremy was taught how to touch cards that corresponded to “wh” questions (see table 3).

All three participants received behavior therapy in the form of discrete-trial teaching and incidental teaching throughout the study. The discrete-trial teaching that was implemented minimized the number of errors participants could make by attempting to block any incorrect responses. If the participant did make an incorrect response, the teacher demonstrated the correct response to the participant and repeated the trial.

### *Setting*

Brady and Ashley were taught in a small room at the University of Kansas. Two participants, Ashley and Jeremy, were also taught during sessions in their homes. The

Table 2. Ashley Skills Taught (3D Objects)

Pair	Condition	Target
Pair One	No-No Prompt	Baby
Pair One	No-No Prompt	Spoon
Pair One	Simultaneous Prompting	Cow
Pair One	Simultaneous Prompting	Fork
Pair Two	No-No Prompt	Banana
Pair Two	No-No Prompt	Sock
Pair Two	Simultaneous Prompting	Dog
Pair Two	Simultaneous Prompting	Marker
Pair Three	No-No Prompt	Plate
Pair Three	No-No Prompt	Pizza
Pair Three	Simultaneous Prompting	Keys
Pair Three	Simultaneous Prompting	Cat

Table 3. Jeremy Skills Taught (“WH” Questions)

Pair	Condition	Target
Pair One	No-No Prompt	Red Light
Pair One	No-No Prompt	Green Light
Pair One	Simultaneous Prompting	Scissors
Pair One	Simultaneous Prompting	Marker
Pair Two	No-No Prompt	Baseball
Pair Two	No-No Prompt	Golf
Pair Two	Simultaneous Prompting	Sad
Pair Two	Simultaneous Prompting	Happy
Pair Three	No-No Prompt	Cold
Pair Three	No-No Prompt	Hot
Pair Three	Simultaneous Prompting	Wake Up
Pair Three	Simultaneous Prompting	Fall a Sleep



research room at the University of Kansas measured ten feet by five feet. The room contained a table, three chairs, and two cabinets. The room also had a one-way mirror that allowed the participants' parents to observe the research session. Home teaching sessions were conducted in a home-therapy room that the parents had already prepared prior to the study. Each room had a table, two chairs, and a variety of toys.

### *Teacher Training*

Teaching sessions were conducted by two of the authors. Both learned to conduct teaching sessions reliably using both of the two methods of prompting responses, simultaneous prompting and no-no prompting, that were evaluated in this study. This was done by having each teacher practice during training sessions in which one person acted as the teacher and the other as the child and then reversed roles. The teachers practiced until they each performed correctly on all teaching trials for two consecutive sessions. Next, both teachers practiced all procedures with a typically developing child. This continued until both teachers were able to perform correctly on all teaching trials for two consecutive sessions. Simultaneously, an observer was trained to record the data collected in the study.

### *Paired Preference Assessment*

A paired preference assessment (Fisher et al., 1992) was conducted before baseline to determine participants' toy preferences of 10 toys. The toys were chosen based on interviewing the participants' parents to find out what their child preferred. In the paired-preference procedure, the teacher randomly selected two toys, put the two toys on the table in front of a participant, and asked the participant to choose one

of the toys with which to play. If the participant made a choice, he or she was allowed to play with the toy for five seconds. The five toys that were chosen most frequently were used as consequences throughout the study. The other five toys were used for participants to play with during break periods.

### *General Procedures*

Research was conducted 3-4 days a week, and sessions lasted for approximately 30 minutes. The purpose of the study was to determine if children learned to touch each card or object from a pair of cards or objects (e.g., two cards with different pictures, two cards with different numbers, two different objects) when asked to do so under different prompting conditions. During each teaching trial, the teacher placed two pictures (or two cards with numbers or two objects) side-by side about 4 in. apart on the table in front of a participant. The positions of the stimulus items were varied in a random sequence so that the item requested was placed on the right and left side an equal number of times. Once the teacher placed the two stimulus items on the table, the teacher said, for example, "Touch the banana." On the next teaching trial, the teachers put the same items on the table in front of the participant, and asked, for example, "Touch the sock. Correct responses of the participants were followed by praise and a toy which the participant could play with up to 5 seconds. What was varied was whether a pair of items was taught using no-no prompting or simultaneous prompting. For both no-no prompting and simultaneous prompting, a prompt that guaranteed success (controlling prompt) was implemented (Wolery et al., 1992).

Prior to any teaching and before each teaching session, probes were conducted. The purpose of probes was to evaluate whether or not participants were learning to touch items correctly. During each probe trial, a teacher placed a pair of items, which were previously taught, on the table in front of a participant and asked the participant to touch one of the items. No prompting procedures were used during probe trials, and each time a participant touched a card or object in response to a request from the teacher, the teacher said, “Good” whether or not a participant touched the correct card or object. In all probes, at least two different pairs of cards or objects were presented and the different pairs were presented in an unsystematic order. As in teaching, the requested items were placed on the right or left side in a random order so that the requested item was placed on the left and the right side an equal number of times.

#### *Teaching sessions*

Each teaching session began with a daily probe to evaluate a participant’s performance with the pairs of items that were currently being taught. The probe was followed by a 3-min break when the participant could play with toys. Next, the participant was asked to come to the table where the first teaching period began using either simultaneous prompting or no-no prompting. At the conclusion of the first teaching period, there was another 3-min break when the participant could play with toys and then the child came back to the table for the second teaching period during which the prompting procedure used was the one not used in the first teaching period.

Which type of prompting procedure was used in the first teaching period was determined randomly.

*No-no prompts.* No-no prompting has also been referred to as wrong-wrong prompting (Leaf & McEachin, 1999). In this method of prompting, the teacher placed the stimulus items in front of the participant and asked the participant to touch one of the items (e.g., “Touch ball”). In this study, participants had 3 seconds to touch one of the items. If the participant responded correctly, the teacher provided a praise statement (“Great”, “Very good”, “Excellent”) and handed the participant one of his or her preferred toys to play with for 5 seconds. Then, the next teaching trial in the predetermined sequence began. If the participant did not touch either of the stimulus items within 3 seconds following the instruction or touched the incorrect stimulus item, the teacher said “No” in a neutral voice tone and picked up the stimulus items. Then the teacher placed the same two cards back on the table again in pre-determined positions, chosen randomly prior to the session, and gave the same instruction (“Touch ball”). If the participant touched the correct item on this trial, the teacher provided praise and the participant could play with one of the preferred toys for 5 seconds. Then, the next predetermined trial was presented. If the participant first touched the incorrect stimulus item or did not touch any stimulus item within 3 sec., the teacher said, “No” in a neutral voice tone, and picked up the two stimulus items. On the third trial following two consecutive incorrect trials, the teacher put the same two stimulus items on the table, gave the same instruction (“Touch ball”), and prompted the participant to touch the correct item. The prompted correct response

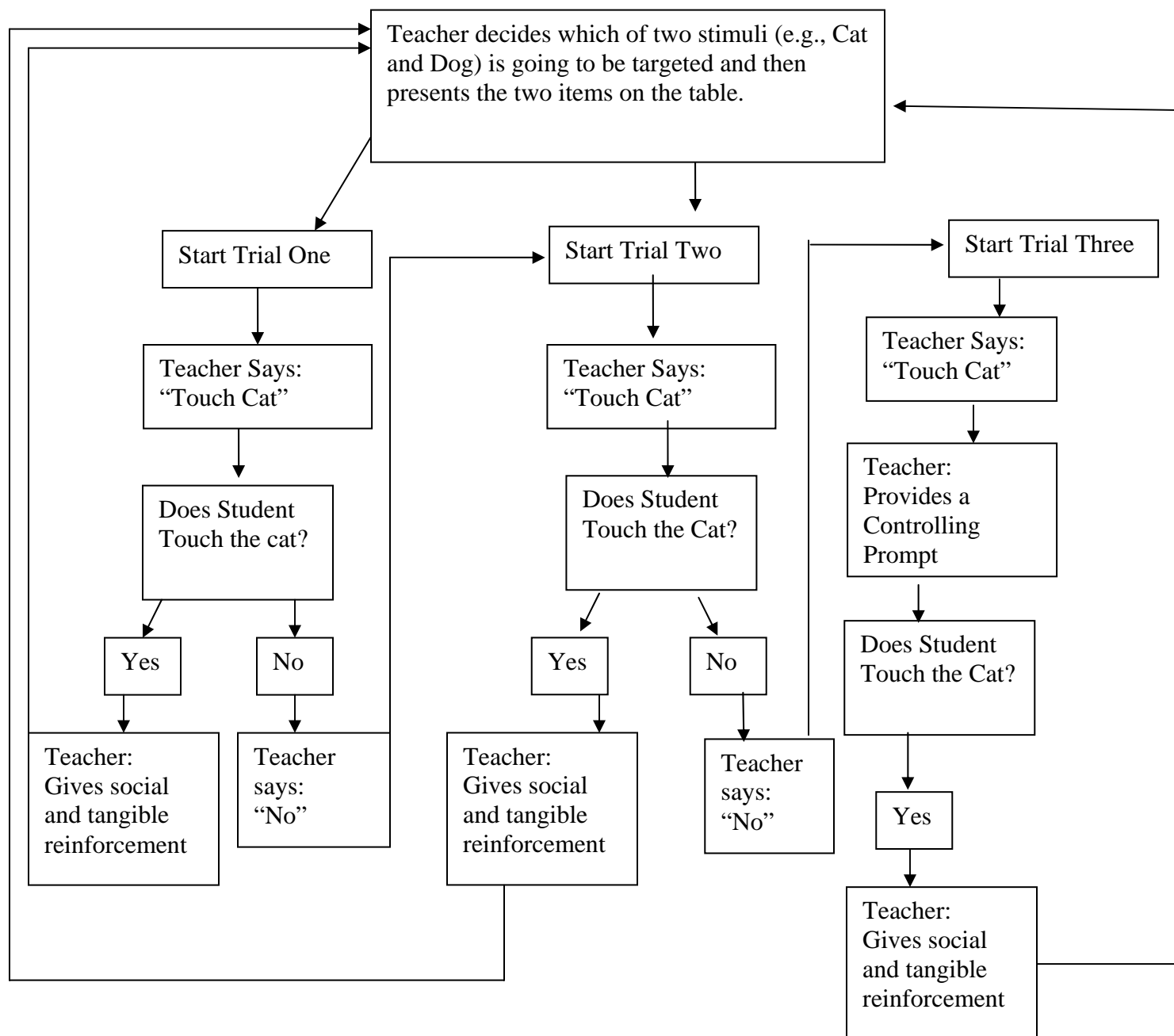
was praised by the teacher and the child was allowed to play with a preferred toy for 5 seconds. This prompting procedure is shown in diagrammatic form in Flow Chart 1.

*Simultaneous Prompting.* In simultaneous prompting, the teacher put two stimulus items on the table in front of a participant, and gave an instruction (e.g., “Touch car”) as was done in no-no prompting. In simultaneously prompting, however, as soon as the teacher gave the instruction, the teacher also prompted the participant to touch the correct item. Then the teacher provided praise and allowed the participant to play with a preferred toy for 5 sec. Simultaneous prompting is shown in diagrammatic form in Flow Chart 2.

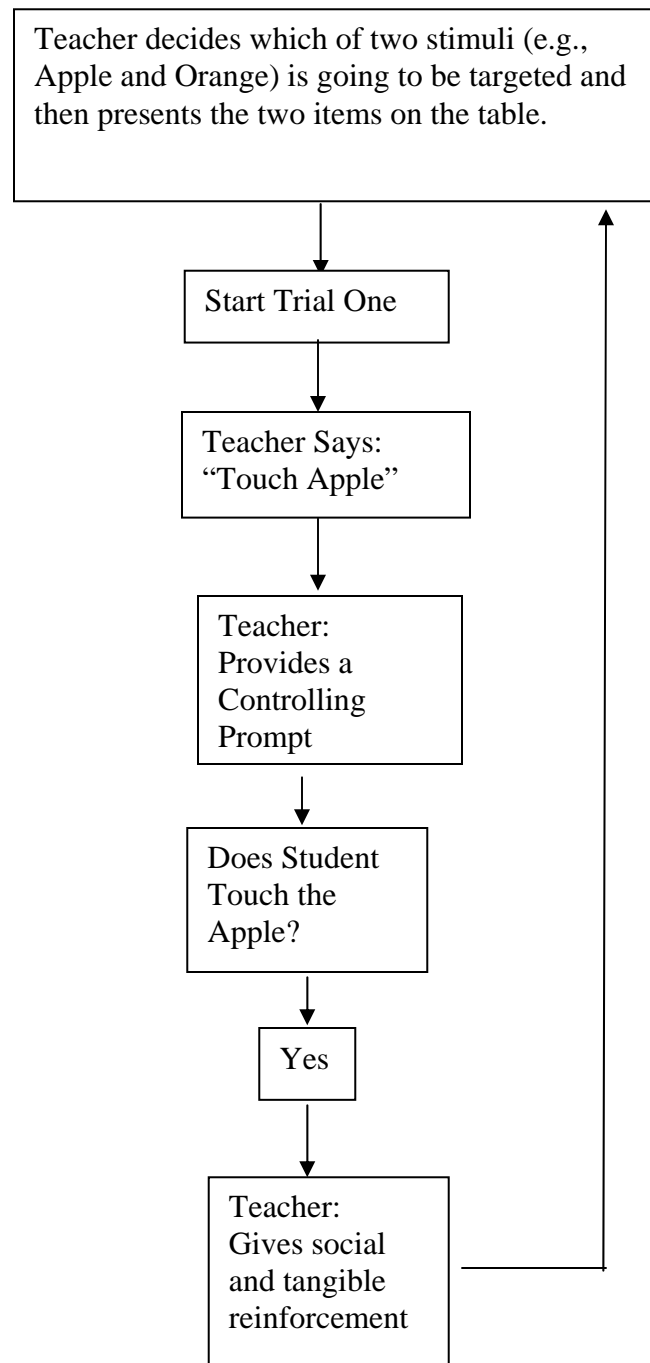
#### *Probe sessions*

As noted earlier, probes were periodically conducted to evaluate whether or not participants touched the correct stimulus items prior to teaching and after teaching. There were two types of probe sessions: daily probes and full probes. Daily probes were conducted prior to each teaching session and were used to determine whether participants learned to touch correctly each member of the two pairs of stimulus items. The criterion for learning a pair of stimulus items was that a participant touched each item of a pair correctly on all probe trials across three consecutive daily probes. The daily probe sessions consisted of 16 interspersed trials where stimulus items from both stimulus pairs taught by simultaneous prompting and no-no prompting were presented an equal number of trials. During each daily probe trial, a teacher placed a pair of items on the table in front of a participant and asked the participant to touch one of the items.

Flow Chart 1. No-No Prompting



Flow Chart 2. Simultaneous Prompting



No prompting procedures were used during daily probe trials, and each time a participant touched a card or object in response to a request from the teacher, the teacher said, “Good” whether or not a participant touched the correct card or object. After every fourth trial, the teacher presented the participant with one of the lesser preferred toys to play with for 5 sec contingent upon them sitting in their seat. The second type of probe sessions was full probe sessions. Full probe sessions were conducted prior to teaching of any stimulus pair and after mastery of a pair to assess if the participant already had the skill in his or her repertoire prior to any teaching and to analyze the maintenance of previously learned skills. Full probes consisted of 64 trials for Brady and Jeremy and 48 trials for Ashley. During full probes, the stimulus items from all stimulus pairs that had been taught or were to be taught were interspersed. The procedures for full probe trials were the same as for daily probe trials.

### *Mastery Criterion*

As stated previously, the mastery criterion for learning a target pair of stimuli was correctly touching each stimulus card of the target pair during all daily probe trials for three consecutive daily probe sessions. If a target pair was mastered at the same time for both the simultaneous prompting pairs and the no-no prompting pairs, teaching stopped for both pairs. If one of the target pairs reached mastery criterion while another target pair did not reach mastery criterion, intervention stopped for the target pair that reached mastery and intervention continued for the target pair that had not yet reached mastery criterion. Four additional teaching sessions were conducted



to determine if additional teaching would produce mastery. If the participant reached 100%, on the third daily probe, after the four additional teaching sessions, then intervention resumed until that participant met mastery criterion or until the participant fell below mastery criterion. After the four teaching sessions, if the participant was not at 100% on the daily probe, then intervention was stopped for that target pair. Following this, a full probe was conducted with all stimulus pairs, those that already had been taught and those to be taught.

#### *Participant Preference of the Two Prompting Procedures*

Different color mats were placed on the table during teaching and probe sessions so that the participants could discriminate between daily probe sessions (blue mat), no-no prompt sessions (red mat), and simultaneous prompting sessions (yellow mat). During every third teaching session, right after the daily probe, the teacher placed both the red and yellow mat on the table and asked the participant which color mat he or she wanted to work with first. The color mat that the participant selected was then worked with first and was recorded to be more preferred for that session. If a participant selected the red mat, a teaching session using no-no prompting was conducted, followed by a teaching session using simultaneous prompting. If a participant selected the yellow mat, teaching using simultaneous prompting occurred first followed by teaching using no-no prompting. The measure of preference for one or the other prompting procedures was which mat (and prompting procedure) the participant selected first.

#### *Interobserver Reliability and Treatment Integrity*

Two types of reliability were taken in this study: dependent variable reliability and independent variable reliability. Dependent variable reliability was calculated by number of agreements divided by number of agreements plus disagreements times 100. Independent variable reliability (Treatment Integrity) was calculated by dividing the number of instructor behaviors observed by the number of instructor behaviors planned. Instructor behaviors for simultaneous prompting were: (1) provide correct instruction, (2) provide a controlling prompt with a zero second delay, (3) provide the toy correctly, and (4) provide social praise correctly. Instructor behaviors for no-no prompts were: (1) provide correct instruction, (2) provide a “no” correctly, (3) provide a prompt only after two consecutive incorrect responses, (4) provide the toy correctly, and (5) provide social praise correctly.

### *Experimental Design*

A modified Alternating Treatment Design (Sulzer-Azaroff & Mayer, 1991) was used to evaluate the effectiveness of the two prompting conditions (simultaneous prompting and no-no prompting). An Alternative Treatment Design is used when comparing two or more independent variables on two or more equivalent dependent variables. Experimental control can be established when one of the dependent variables that is assigned to a particular independent variable increases more rapidly than the other.

## **Results**

### *Mastery Criterion*

Across three participants, 3 or 4 stimulus pairs were taught using the no-no prompting strategy and 3 or 4 stimulus pairs were taught using the simultaneous

prompting strategy. Figure 1, 2, and 3 show the results for Brady, Ashley, and Jeremy, respectively. Brady learned all four stimulus pairs taught with the no-no prompting procedure and only one stimulus pair taught with simultaneous prompting. Ashley learned all three stimulus pairs taught with no-no prompting and no stimulus pair taught with simultaneous prompting. Jeremy learned all three stimulus pairs taught with no-no prompting and no stimulus pairs taught with simultaneous prompting. Thus, the no-no prompting procedure appeared to be more effective in teaching participants to point to the correct cards or objects.

#### *Participant Preference of Prompting System*

Mixed results were seen for participant preference of the two prompting systems, as shown in figure 4. Brady selected the no-no prompting condition more frequently than the simultaneous prompting condition. When Ashley made a choice, the no-no prompting condition was chosen more frequently than the simultaneous prompting condition; however, since she made a no choice response several times, it is unclear if she understood the point of making a choice. Jeremy chose the simultaneous-prompting condition more frequently.

#### *Efficiency/Learning to Learn*

Figure 5 shows the performance of the three participants on no-no prompting trials during teaching. This graph shows that for two of the participants (Brady and Ashley), the proportion of trials that were correct (with no prompts) increased as successive stimulus pairs were taught. This suggests that these two participants were becoming more efficient in learning as they were taught new pairs using the no-no

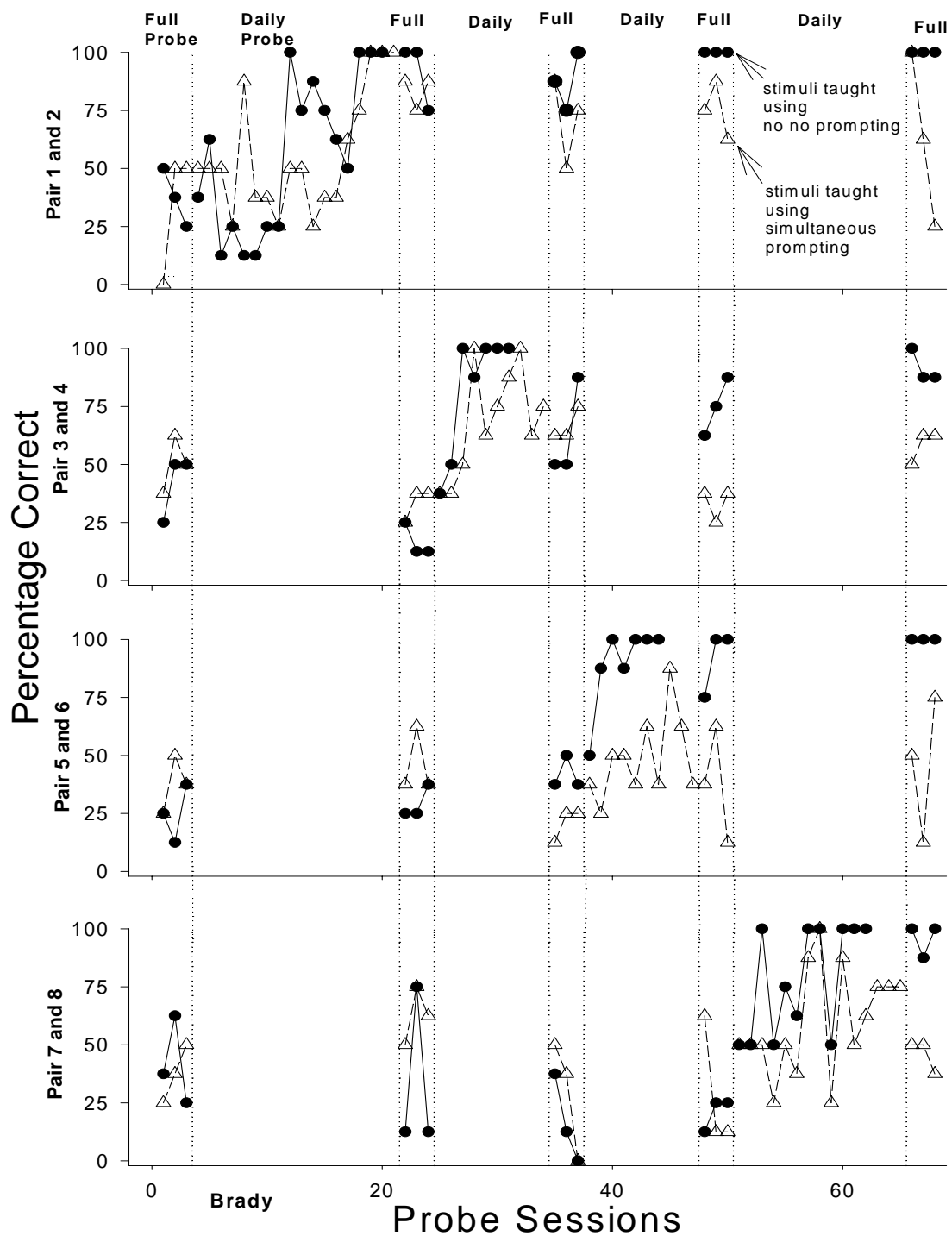


Figure 1. Percentage of probe trials correct during full probes and daily probes across four stimulus pairs for Brady. One stimulus pair was taught using no-no prompting and the other stimulus pair was taught using simultaneous prompting.

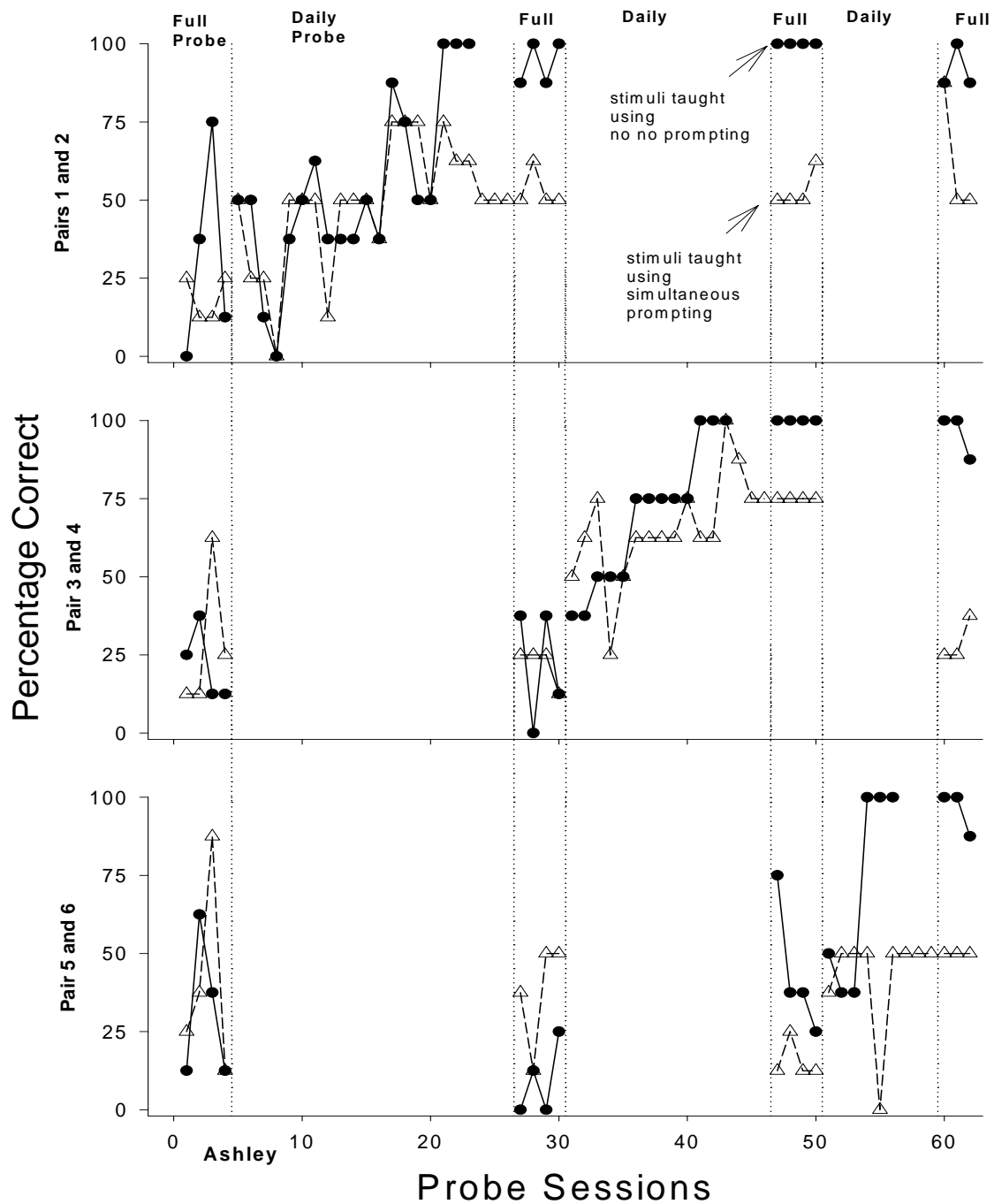


Figure 2. Percentage of probe trials correct during full probes and daily probes across four stimulus pairs for Ashley. One stimulus pair was taught using no-no prompting and the other stimulus pair was taught using simultaneous prompting.

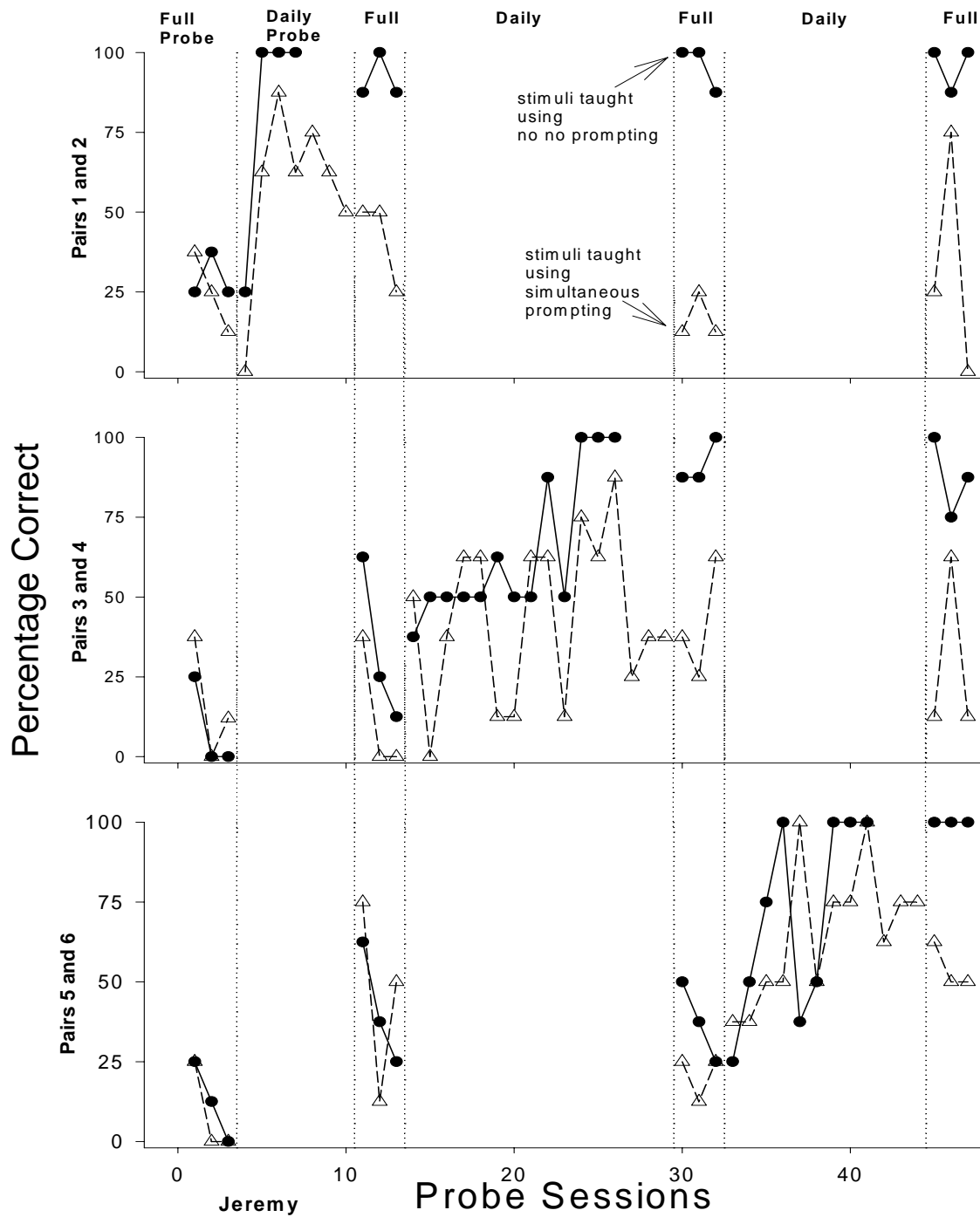


Figure 3. Percentage of probe trials correct during full probes and daily probes across four stimulus pairs for Jeremy. One stimulus pair was taught using no-no prompting and the other stimulus pair was taught using simultaneous prompting.

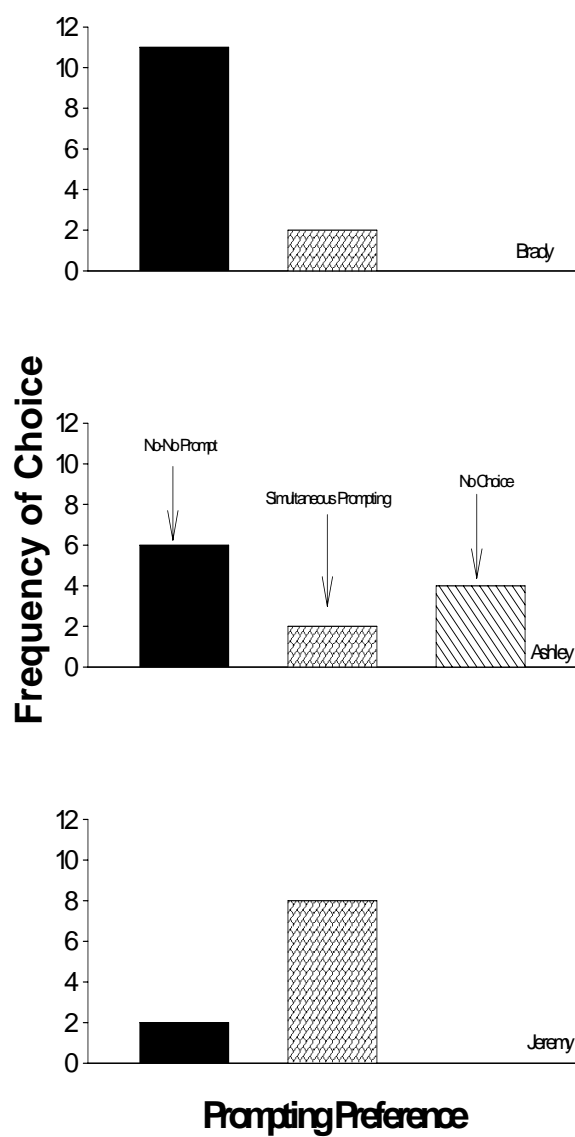


Figure 4. Frequency of choice for the no-no prompting procedure and the simultaneous prompting procedure by Brady, Ashley, and Jeremy.

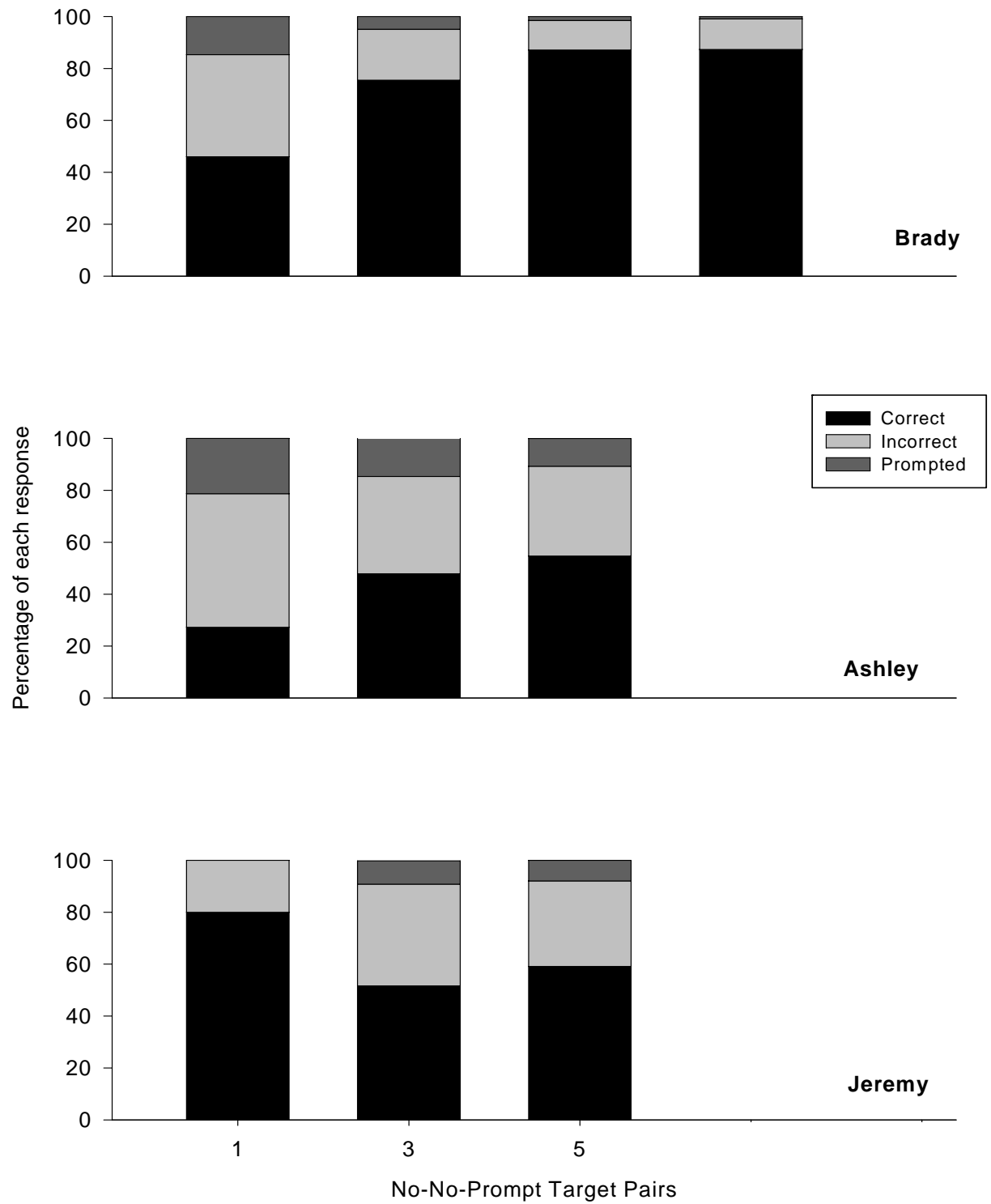


Figure 5. Percentage of trials that were correct without a prompt, correct with a prompt and incorrect during no-no prompt trials for Brady, Ashley, and Jeremy.



prompting procedure. No such pattern was evident in Jeremy's performance.

### *Maintenance*

After at least one stimulus pair met mastery criteria during a teaching probe, a full probe of test performance on all stimulus pairs was conducted. This provided an evaluation of maintenance (of pairs previously taught) and of baseline performance (of pairs not yet taught); as shown in Figures 1, 2, and 3. The data for the full probes shows that accuracy of performance on stimulus pairs taught with the no-no prompting procedure maintained at levels that were almost as high as those achieved during initial teaching. Performance on the stimulus pairs taught with the SP procedure either remained at the level they achieved during initial teaching or declined slightly.

### *Reliability*

Reliability was assessed in 52% of the daily probe sessions, 48% of the full probe sessions, and 52% of teaching sessions (see Table 4). Reliability for the daily probe sessions was 96.5%, ranging from 81.3% to 100% (see Table 4). Reliability for full probe sessions was 95.6%, ranging from 85% to 100% (see Table 4). Reliability for teaching sessions was 99.2%, ranging from 75% to 100% (see Table 4).

### *Treatment Integrity*

Treatment integrity data indicates that both the no-no prompting and simultaneous prompting were implemented with a high degree of integrity (see Table 5).

Table 4. Dependent Variable Reliability

<b>Condition</b>	<b>Sessions with Reliability</b>	<b>Reliability</b>	<b>Range</b>
Baseline	47.6%	95.6%	85-100%
Daily Probe	51.9%	96.5%	81.3-100%
Teaching Sessions	51.8%	99.2%	75-100%

Table 5. Treatment Fidelity

Final No-No Prompt Treatment Integrity	
Measurement	Treatment Integrity Percentage
Percentage of trials where treatment integrity was measured	58.9%
Correct Trials	99.5%
Correct Instruction	100%
Giving Tangible Reinforcement Correctly	99.3%
Giving Social Reinforcement Correctly	99.8%
Giving “No” Correctly	100%
Giving Consequence Correctly	99.5%
Giving Prompt Correctly	100%
Final Simultaneous Prompting Treatment Integrity	
Measurement	Treatment Integrity Percentage
Percentage of trials where treatment integrity was measured	57.2%
Correct Trials	99.7%
Correct Instruction	100%
Giving Tangible Reinforcement Correctly	99.9%
Giving Social Reinforcement Correctly	99.9%
Giving “No” Correctly	100%
Giving Consequence Correctly	99.9%
Giving Prompt Correctly	99.9%

## Discussion

In this study, the no-no prompting procedure was more effective than simultaneous prompting in teaching two-choice discriminations with all three of the participants. Additionally, two of the participants showed more rapid learning as they learned subsequent pairs of stimuli with the no-no prompt procedure. Finally, one of the participants showed a clear preference for the no-no prompt procedure, one showed a preference for the simultaneous prompting procedure, and one participant showed no clear preference for either prompting procedure.

The no-no prompting procedure that has been used clinically with a number of children with autism has been described in a curriculum book (Leaf & McEachin, 1999) and is reportedly effective. There are no experimental studies published, however, that have examined the relative effectiveness of the no-no prompting procedure to other commonly used prompting procedures. This study thus adds to the small amount of existing literature comparing the relative effectiveness of different ways of using prompts. There are several possible factors that may be related to why the no-no prompting procedure was a more effective teaching procedure than the simultaneous prompting procedure in the present study. One reason is that the no-no prompting procedure may have provided more “informative” consequences. In the teaching sessions using the no-no prompting procedure, there were differential consequences for correct and incorrect responses. In the teaching sessions using simultaneous prompting procedure, there were no differential consequences because each response was a prompted correct response and produced positive consequences.

The differential consequences for incorrect responses in the no-no prompting procedure might have indicated to the learner not only that their initial response was incorrect but also that the stimulus that the participant did not touch was the correct stimulus. Thus, the “no” may have served to promote correct responses on the next trial, which was a repetition of the previous trial (Lovaas, 2003). A second reason, closely related to the “informative” nature of the differential consequences in the no-no prompting procedure, is that once an error had been made, participants had an immediate opportunity to practice again with the same set of stimuli. These two factors, operating together, may have increased the likelihood of the participant making a correct unprompted response on the trial following an error, and being reinforced for making this correct unprompted response. If these two factors were related to the greater effectiveness of the no-no prompting procedure, then they probably would have greater effects in two-choice discrimination tasks than in discrimination tasks involving three or more choices.

A third factor that may have contributed to the greater effectiveness of the no-no prompting procedure is that it required a participant to look at and compare the visual stimuli to maximize the overall rate of reinforcement during teaching. The simultaneous prompting procedure did not require a participant to look at and compare the visual stimuli because a participant was immediately prompted by the teacher to make the correct response and was reinforced immediately following the prompted response. Thus, it is possible that participants became dependent on the prompt to make correct responses and did not learn to look at and make correct

responses when prompts were not provided. In the no-no prompting procedure, such prompt dependency might have been less likely to develop because at least 67% of the teaching trials were unprompted, and to maximize the overall rate of positive reinforcement, it was necessary for participants to look at the stimulus choices to respond correctly and consistently on unprompted trials.

As noted earlier, one of the possible reasons that the no-no prompting procedure might be more effective is because the “no” is “informative” by indicating that the other stimulus is the correct one. If this were true, then adding more stimulus choices would reduce the “informative” value of the “no” in direct proportion to the number of stimulus choices that are available. Clearly, additional research using tasks with three and more stimulus choices would be very useful in addressing this issue.

There are also a number of issues that may limit how effective no-no prompting procedures are in teaching new skills. One issue is the type of responses being taught. In the present no-no prompting procedure, there were two possible responses that could result in reinforcement and the topography of the responses were highly similar (pointing to a card or item). A great deal of teaching, however, is often done to establish responses that have almost an infinite variety of topographies such as teaching vocal imitation, or play skills, or social behavior. Whether the no-no prompting procedure would be more effective than the simultaneous prompting procedure in addressing these types of skills, or even effective at all, is an open question.

A second issue is that the present comparison involved testing the effects of two specific examples of two types of prompting procedures. Within both no-no prompting procedures and simultaneous prompting procedures, there are many variations possible such as varying the number of incorrect responses possible in the no-no prompt procedure before a prompt is used (Leaf & McEachin, 1999), or by introducing slight delays prior to providing a controlling prompt in the simultaneous prompting procedure, or varying the “completeness” of the prompt in the simultaneous prompting procedure. Future researchers should attempt to examine variations of the no-no prompting and simultaneous prompting procedure on how it relates to the effectiveness of the two prompting procedures.

A third issue is the limited number and type of participants that were involved in this study. Replications with additional participants are necessary to be able to determine whether or not results similar to those in the present study can be obtained. Also required are replications with different types of participants.

A possible fourth issue in considering the results of the present study is the interval of time that passed between teaching sessions. Most of the teaching sessions were conducted with a 48-hour interval between them. On some occasions, however, there were longer intervals between teaching sessions due to illnesses of the children and vacation periods when the children were not available. Although the different intervals of time between teaching sessions were equally operative for both the no-no prompting procedures and the simultaneous prompting procedures, it is possible that

one procedure was more “sensitive” to the effects of such variations and this influenced the outcome of the present results.

A final issue for consideration is about the implementation of the no-no prompt procedure. The intent of providing a “no” following incorrect responses in the no-no prompt procedure was simply to be informative or corrective rather than aversive. The “no” was delivered in a neutral voice tone and at a volume that was the same as the instructions given to participants (e.g., “touch the ball”) to start each learning trial. Whether or not the “no” was an essential part of the greater effectiveness of the no-no prompt procedure is not known and will require additional research and component analysis. If the “no” provided following incorrect responses was a significant part of the greater effectiveness of the no-no prompt procedure, the results of the present study suggest that “no” said in a neutral tone and at normal volume is effective. Thus, there seems to be no basis at the present time for using any stimulus that is, in itself, more aversive. For teachers who feel that the use of “no” is not appropriate during teaching no matter how it is said, it is possible that some other type of stimulus (that is in itself not aversive) could be used consistently following incorrect responses to produce the same learning benefits. It should be noted that one of the participants consistently chose the no-no prompt procedure over the simultaneous prompting procedure and one showed no clear preference. Thus, the no-no prompt procedure did not appear to be more aversive to participants than did the simultaneous prompting procedure.



The results of this study indicate that a no-no prompt procedure is more effective than a simultaneous prompting procedure when teaching two-choice discrimination tasks requiring a simple pointing response for three children with autism. In addition, the no-no prompt procedure was preferred over a simultaneous prompting procedure with one of the three participants. Clinicians might consider using a no-no prompt procedure when teaching similar two-choice discriminations. At the same time, we need considerable additional research to examine the effectiveness of both the no-no prompting and simultaneous prompting procedures in teaching additional children and with different numbers of choices and response topographies.

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